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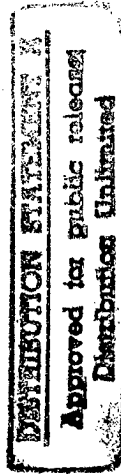
BALLISTIC MISSILE LAUNCH CAPABILITY

BRIEFING TO
NATIONAL RESEARCH COUNCIL
COMMITTEE ON STRATEGIC ASSESSMENT OF
EARTH - TO - ORBIT PROPULSION OPTIONS

BY

LT COL JAMES K. HODGE

BALLISTIC MISSILE ORGANIZATION
SPACE SYSTEMS DIVISION
AIR FORCE SYSTEMS COMMAND
UNITED STATES AIR FORCE



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Abstract: The briefing covers the orbital applications of Minuteman II derivatives and Peacekeeper derivatives.

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AGENDA

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OVERVIEW

REENTRY SYSTEMS LAUNCH PROGRAM (RSLP)

SUBORBITAL LAUNCH SERVICES FOR DOD PROGRAMS FOR 30 YEARS

TARGETS FOR BALLISTIC MISSILE DEFENSE

TEST BED FOR BALLISTIC MISSILE DEVELOPMENT

CONCEPT:

UTILIZE DEACTIVATED MISSILES AS ECONOMIC VEHICLES

PROCURE NEW HARDWARE TO MEET UNIQUE REQUIREMENTS

LAUNCH FROM MODIFIED SILOS AT WESTERN TEST RANGE

OTHER SITES FOR SOUNDING ROCKETS

MINUTEMAN II UTILIZATION

LARGE NUMBER OF MISSILES BEING DEACTIVATED AND STORED

REPLENISH SCARCE ROCKET MOTORS FOR SUBORBITAL LAUNCHES

PLANNED SUBORBITAL FACILITY AT EASTERN TEST RANGE

REACTIVATE ABOVE GROUND MINUTEMAN SITE

MULTISERVICE LAUNCH SYSTEM (MSLS) CONTRACT IN PROCUREMENT

Minuteman II Drawdown

Rocket Motors Excess to Strategic Offense

	FY	92	93	94	95	96	97	TOTAL
Retired Boosters	80	89	110	87	38	46	46	450
Available Boosters Broken Down into Rocket Motor Stages								
Stage I	*0	89	110	87	38	46	46	370
Stage II	*50	*54	110	87	38	46	46	385
Stage III	**120	89	110	87	38	46	46	490

* MMIII spares taken from MMII drawdown

** Includes motors released from MMII spares

Storage Required Regardless of Disposition

MULTISERVICE LAUNCH SYSTEM IN PROCUREMENT

INTEGRATED SYSTEM CONCEPT FOR R&D FLIGHTS

HARDWARE

INTEGRATION

LAUNCH SERVICES

MODULAR FRONT SECTION WITH COMMON BASIC COMPONENTS

MISSILE GUIDANCE

RANGE SAFETY

TEST STRUCTURES AND DEPLOYMENT MECHANISMS

FOR A VARIETY OF CONFIGURATIONS AND VEHICLES

SOUNDING ROCKETS

ICBM CLASS R&D SUBORBITAL TEST FLIGHTS AND TARGETS

SIMPLE OR COMPLEX DEPLOYMENTS

OPTIONAL ORBITAL LAUNCH VEHICLES

USES MMII/III HARDWARE

ORBITAL LAUNCH APPLICATIONS

MMII DERIVATIVES

CAPABILITY FOR LOW COST SPACE LAUNCH VEHICLE

BOOSTER IS SUNK DOD COST (\$7M SUBSTITUTION VALUE)

OPERATIONAL AND SUBORBITAL VEHICLES

GOVERNMENT REFURB AT \$50K PER MISSILE STAGE

SHARE PROCESSING AND LAUNCH FACILITIES

COMMON MSLS SUBSYSTEMS WITH SUBORBITAL VEHICLES

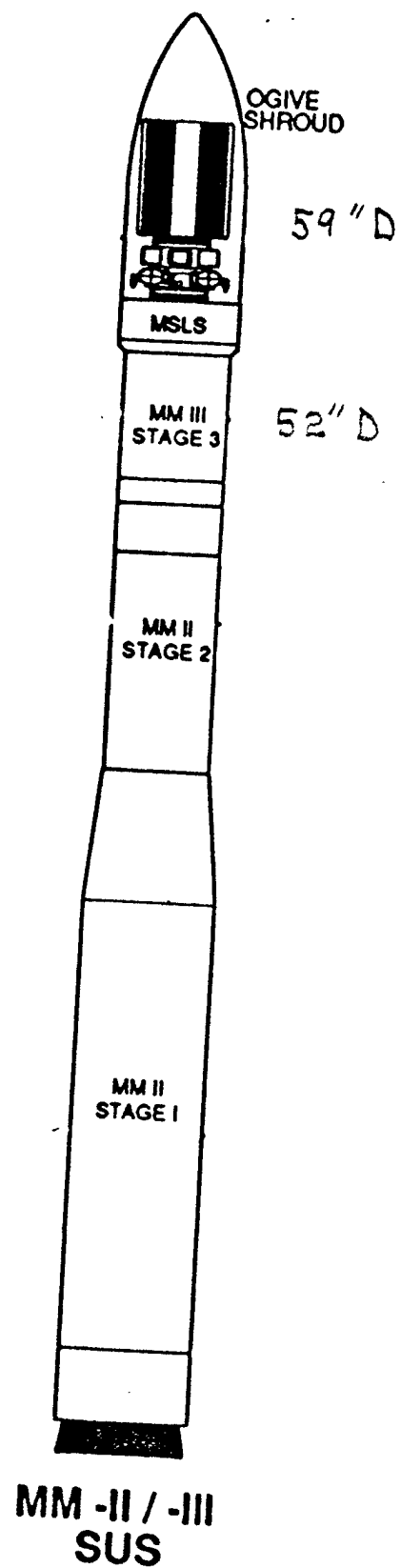
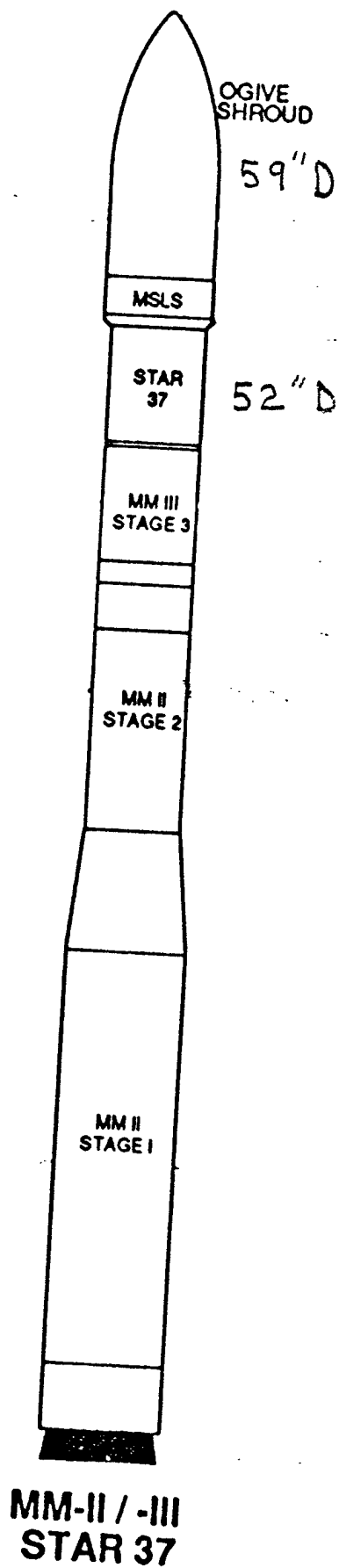
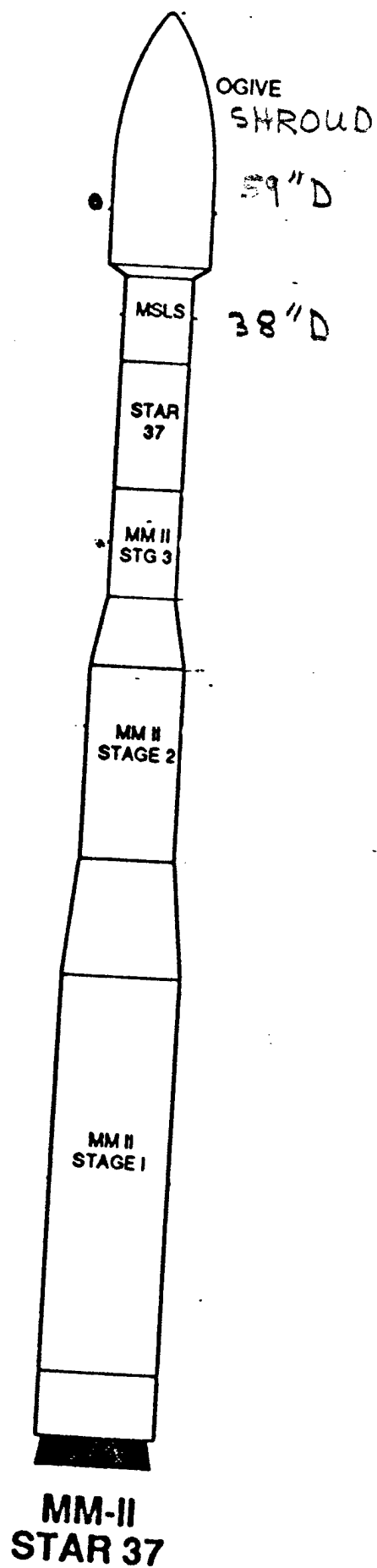
UPGRADED CONFIGURATIONS PART OF MULTISERVICE LAUNCH SYSTEM

MINUTEMAN III STAGE III

LIMITED NUMBER AVAILABLE FOR DOD USE

STAR 37, OR STAR 48 4th (KICK) STAGE

SMALL UPPER STAGE (SUS) TRANSFER VEHICLE



FEASIBILITY STUDY

CONFIGURATION SELECTED FOR ANALYSIS: MMII/III WITH STAR 37

PAYLOAD CHARACTERISTICS: DIAMETER 56", WEIGHT 800 lbs

NOMINAL TRAJECTORY: 28.5 DEG, 350 NM ORBIT CIRCULARIZED
WITH A KICK STAGE

CONCEPTUAL DESIGN

STRUCTURES, AERODYNAMICS, MASS PROPERTIES

TRAJECTORY SHAPING

LOAD ANALYSIS

HEATING

AERODYNAMIC AND STRUCTURAL MARGINS

CONTROL ANALYSIS

BENDING MODES AND LINEAR STABILITY ANALYSIS

FEASIBILITY STUDY RESULTS

MM-II/III WITH STAR 37

MINIMAL BUFFETING CONCERNS

ADEQUATE STRUCTURAL MARGINS

ADEQUATE STABILITY MARGINS

MINUTEMAN-II WITH STAR 37 MORE STRESSING DUE TO HAMMERHEAD

BUFFETING

STRUCTURAL CAPABILITY

PERFORMANCE

SMALL PAYLOAD CAPABILITY TO LOW EARTH ORBIT

CONCLUSION:

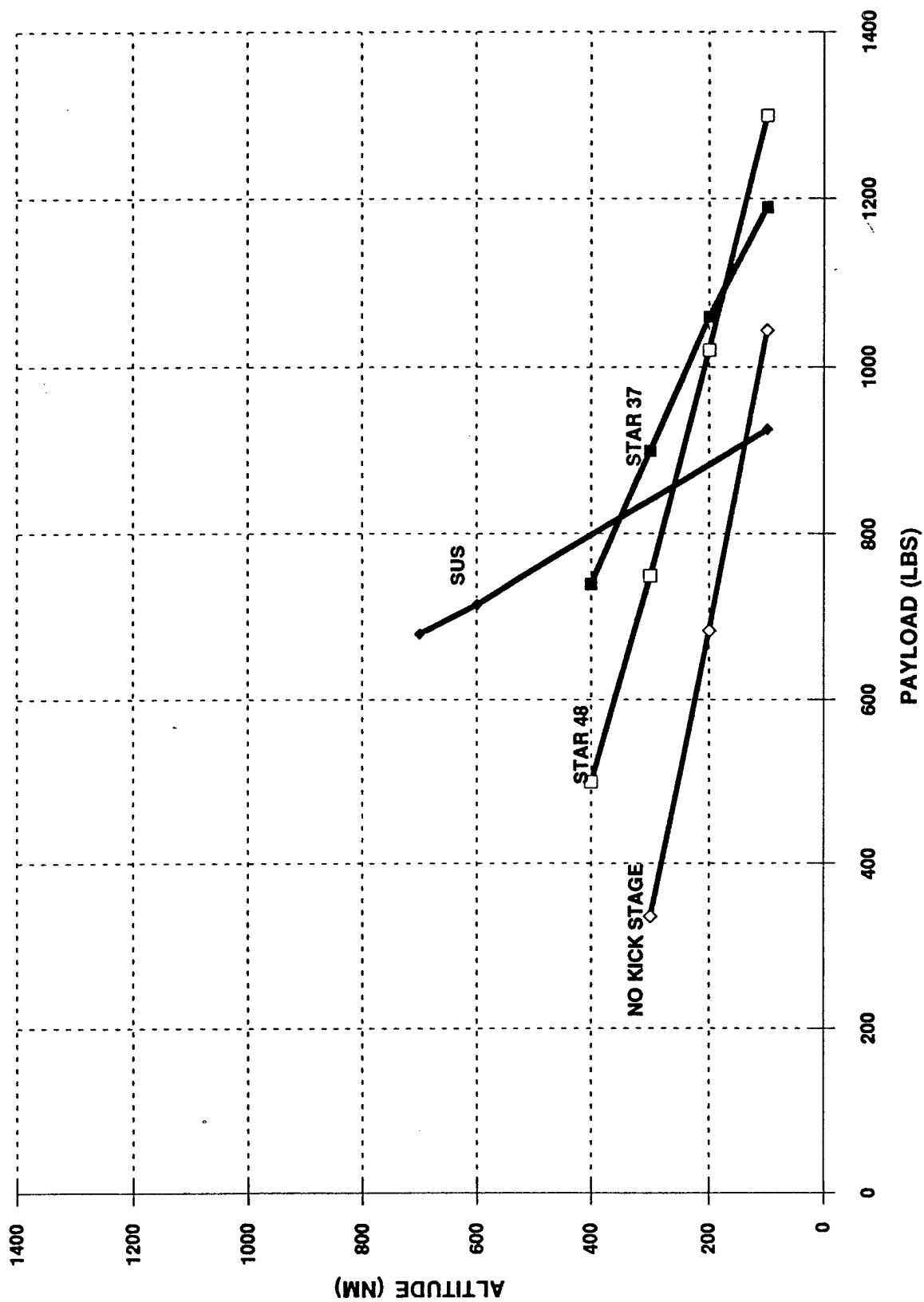
MINUTEMAN WITH STAR 37 FEASIBLE

MORE ANALYSIS REQUIRED FOR OTHER CONFIGURATIONS

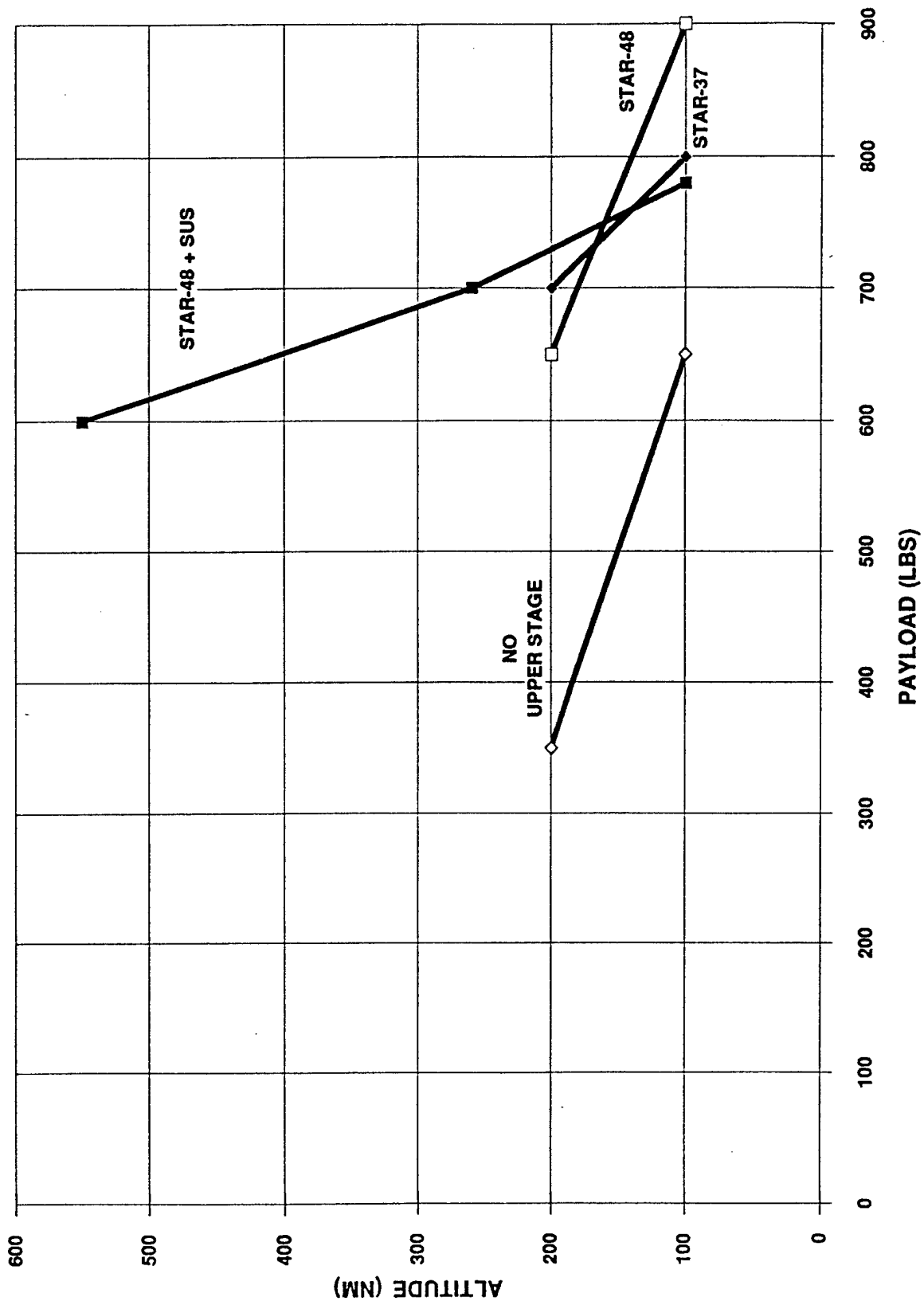
SPACE VEHICLE-RELATIVE ENVIRONMENTS

CONFIGURATION	PAYLOAD WEIGHT	ACCELERATION AXIAL	VIBRATION		SHOCK MAX	ACOUSTIC
			SECTION	COMPONENT		
MINUTEMAN - SILO	1000 LB	9 Gs	8.4 GRMS	17.8 GRMS	<500 Gs	155 DB
MINUTEMAN - PAD SPACE LAUNCH	400-1200 LB	8 Gs	7.0 GRMS	10.0 GRMS	<500 Gs	140 DB
SCOUT	400 LB	9.2 Gs	5.8 GRMS	8.6 GRMS	200 Gs	137 DB
TITAN II	3000-5000 LB	10 Gs	10.6 GRMS	14.1 GRMS	200 Gs	140 DB
TITAN III	21K-33K LB	6 Gs	8.4 GRMS	-	4100 Gs	142 DB
TITAN IV	29K-39K LB	5.6 Gs	7.8 GRMS	-	-	-
ATLAS I	4500 LB	5.5 Gs	5.3 GRMS	-	2000 Gs	138 DB
DELTA II	4200 LB	6.3 Gs	8.7 GRMS	-	5500 Gs	144 DB
PEGASUS	600 LB	8.5 Gs	5.6 GRMS	-	600 Gs	-
ARIAN	-	5.0 Gs	7.3 GRMS	-	2000 Gs	142 DB
AMROC	1500 LB	8.0 Gs	5.5 GRMS	-	7000 Gs	144 DB

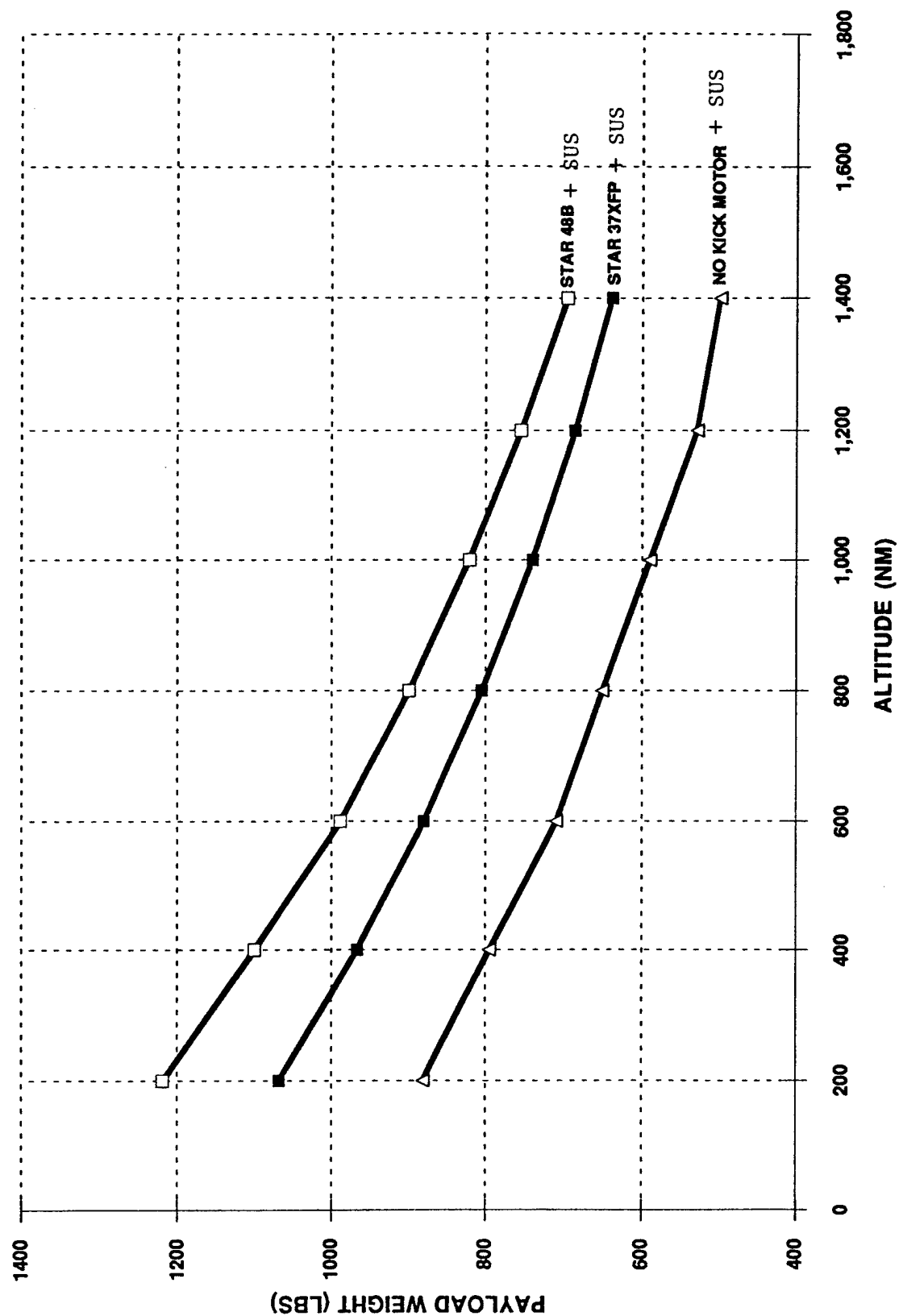
MM II/III DERIVATIVES
ETR LAUNCHES 28.5° INCLINATION



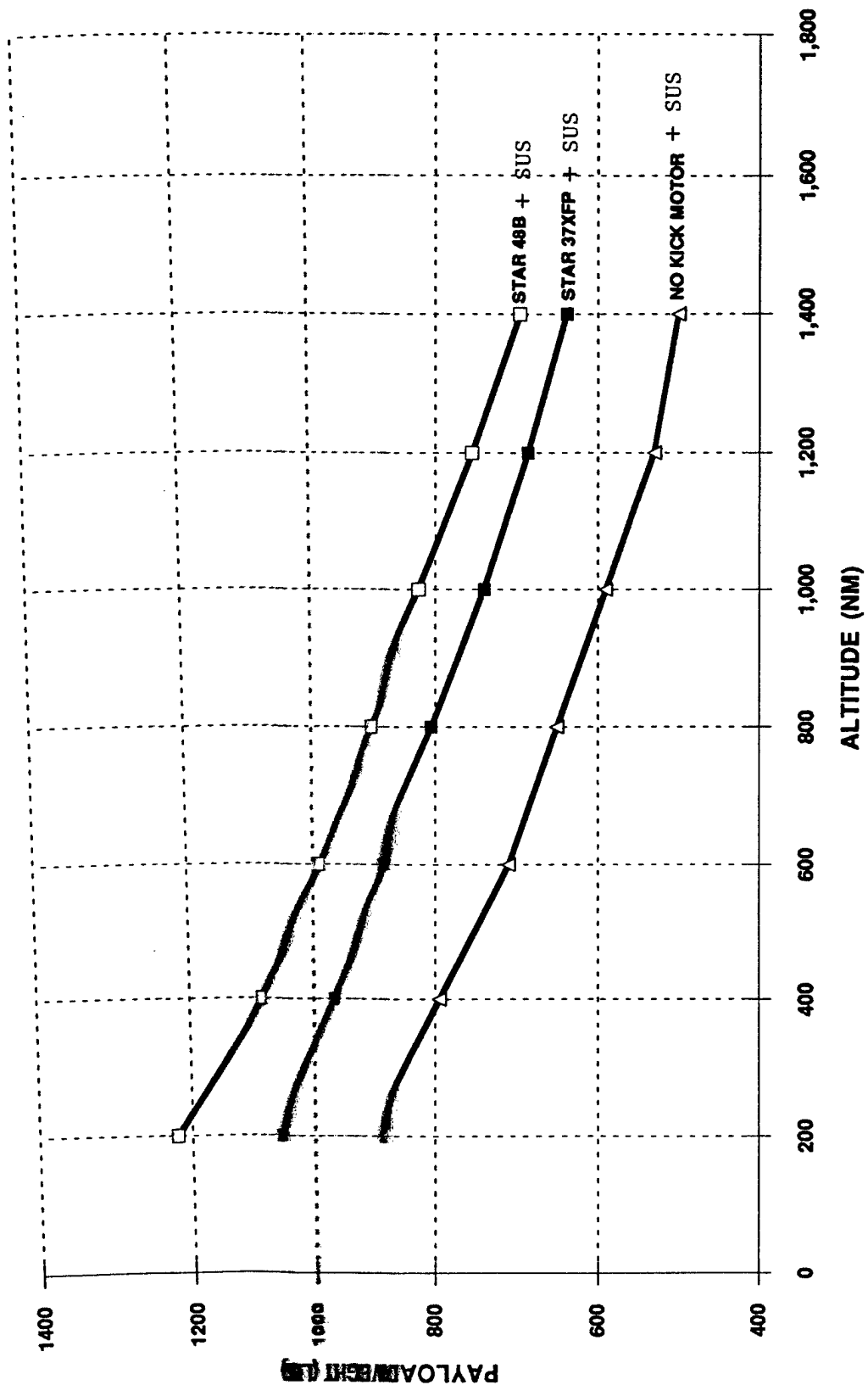
MM II/III DERIVATIVES
WTR LAUNCHES (90° INCLINATION)



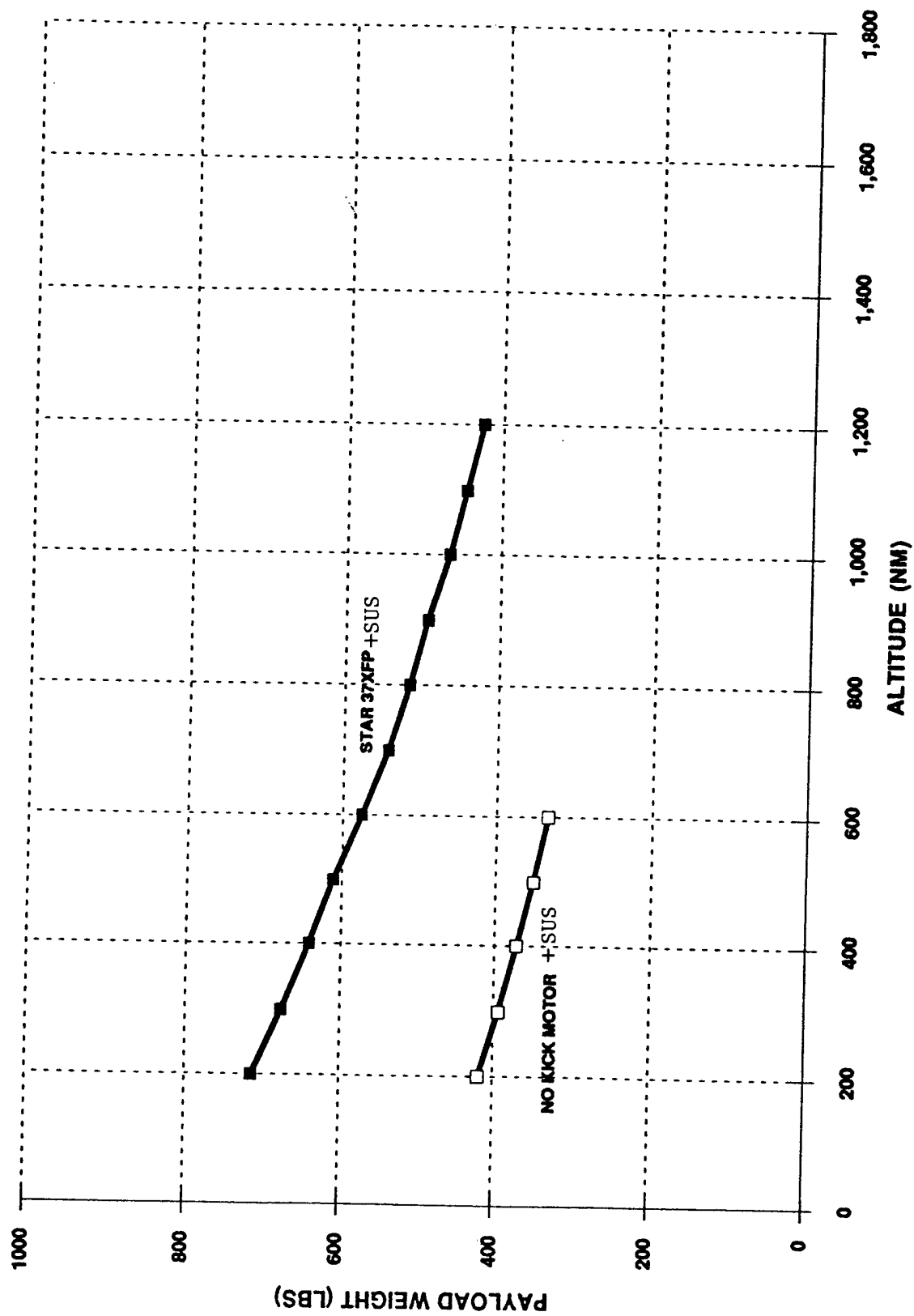
MMII WITH MMIII STAGE 3
Boost Into 100nm Parking Orbit
SUS Motor for Hohmann Transfer and Circularize



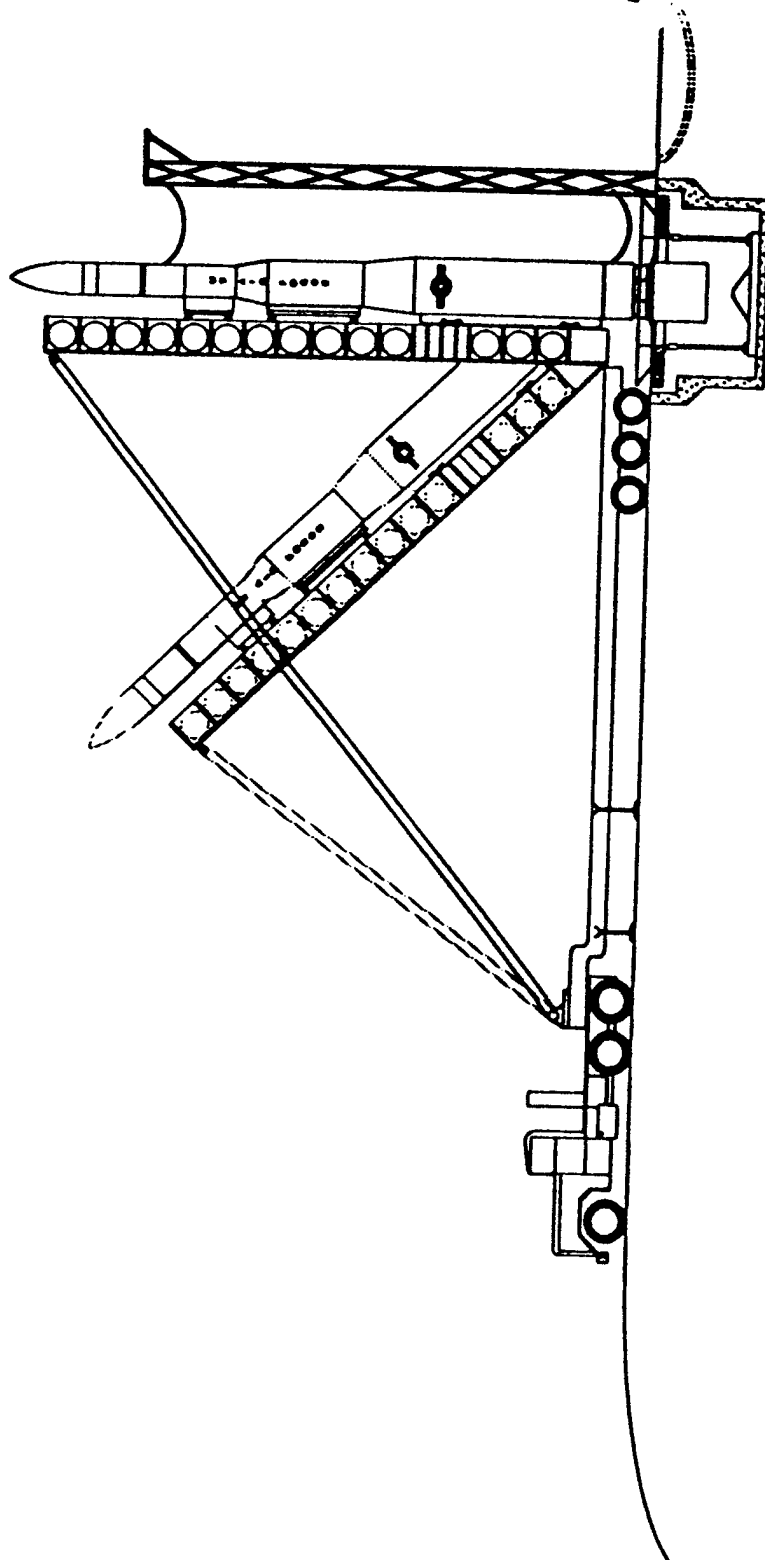
MMIII WITH MMIII STAGE 3
 Boost Into 100nm Parking Orbit
 SUS Motor for Hohmann Transfer and Circularize



**MMII BOOST INTO 100nm PARKING ORBIT
SUS Motor for Hohmann Transfer
and Circularize**



**MMII BOOSTER EMPLACEMENT
ETR LAUNCH COMPLEX**



ORBITAL APPLICATIONS PEACEKEEPER DERIVATIVES

CONFIGURATIONS CONSIDERED

BASIC PEACEKEEPER 3-STAGE MISSILE WITH UPPER STAGE(S)

EXISTING SPACE QUALIFIED UPPER STAGES

OPTIMIZED UPPER STAGE

PEACEKEEPER/MINUTEMAN DERIVATIVE

PK STAGE 1, MMII STAGE 1 & 2, MMIII STAGE 3

PEACEKEEPER DERIVATIVES ORBITAL PERFORMANCE

MODIFIED PEACEKEEPER

LOW ALTITUDE CIRCULAR ORBITS

4000-7000 LBS AT 100-600 NM

HIGH ALTITUDE CIRCULAR ORBITS

UP TO 1800 LBS HALF GEOSYNCHRONOUS

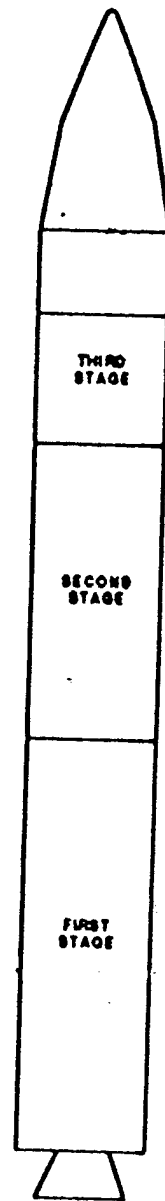
UP TO 1100 LBS TO GEOSYNCHRONOUS

PEACEKEEPER/MINUTEMAN HYBRID

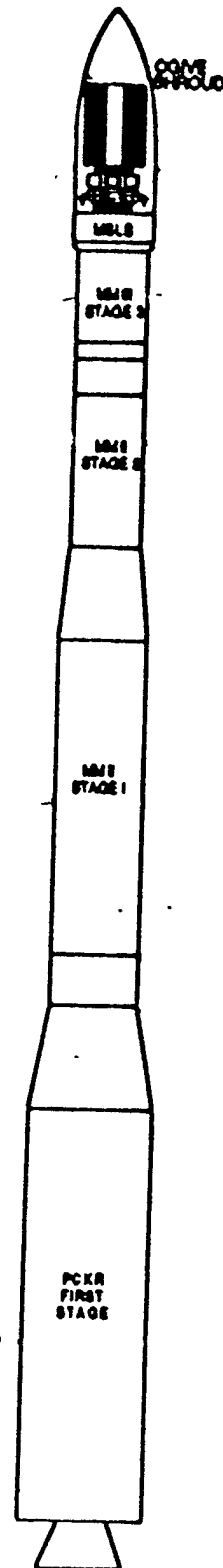
CIRCULAR ORBITS AT 28.5 DEG INCLINATION

500-4000 LBS AT 500-10,000 NM

875 LBS TO MOLNIYA ORBIT

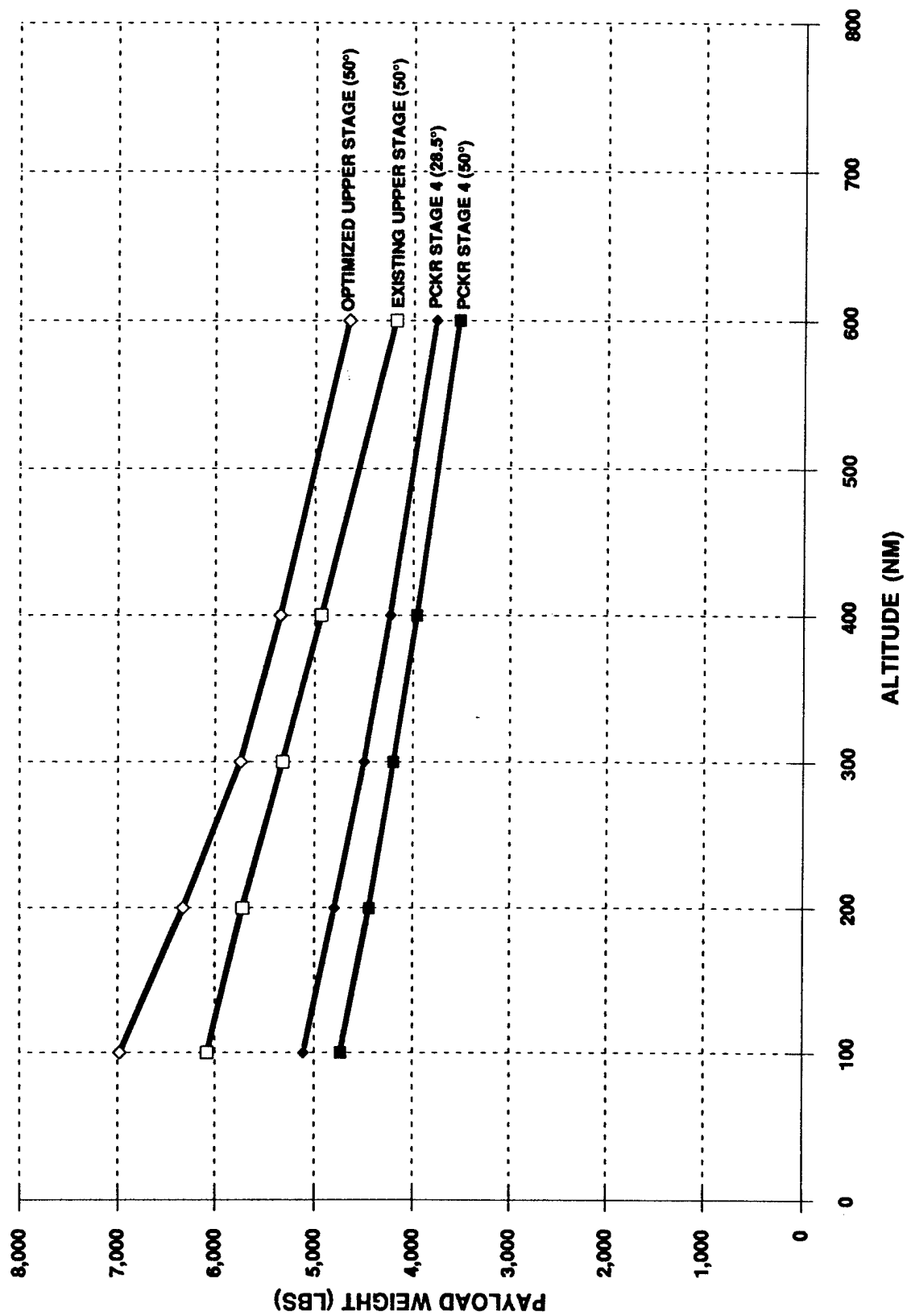


PCKR MISSILE

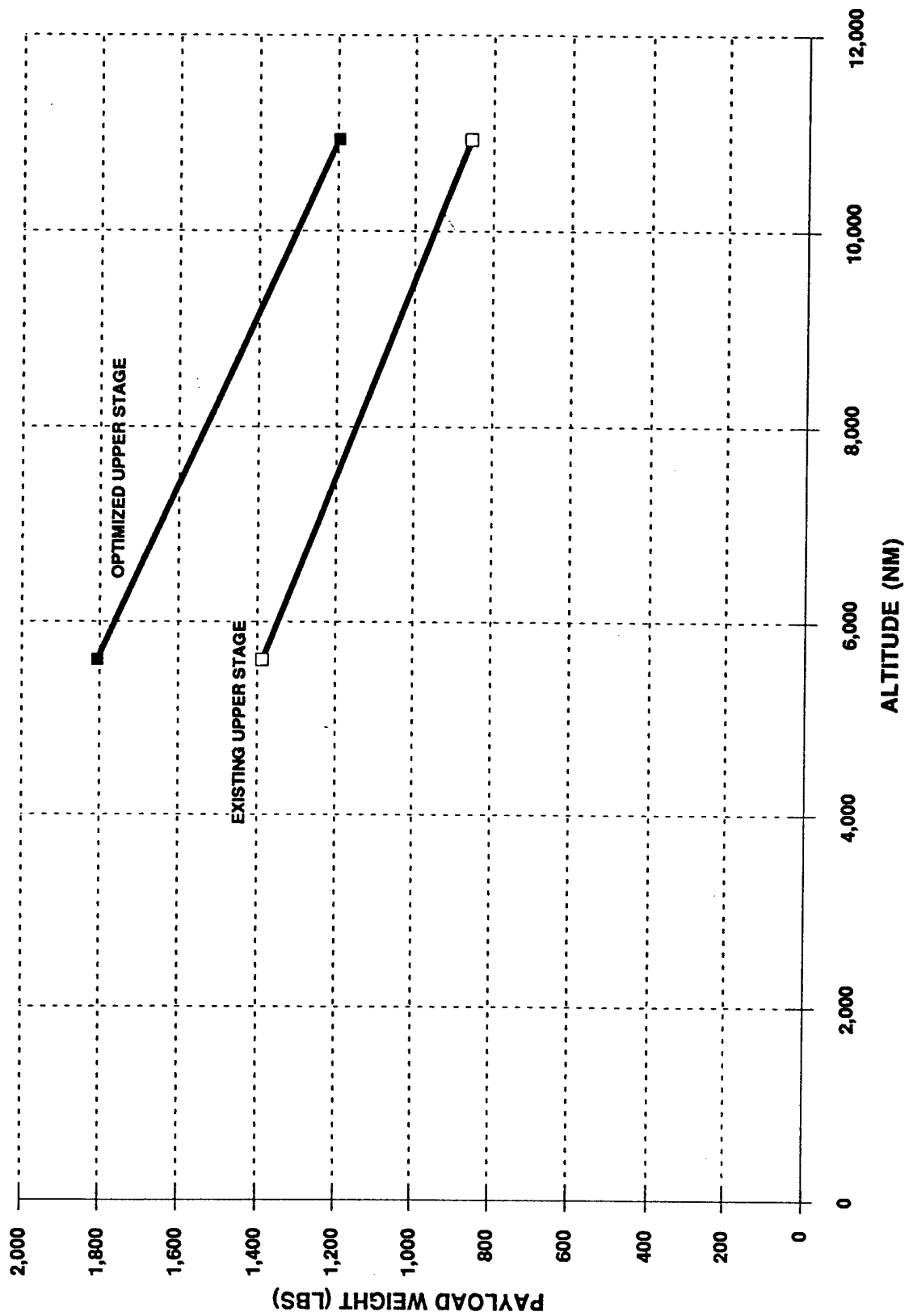


**PCKR / MM-II STAGE 1
MM-II STAGE 2 / MM-III STAGE 3**

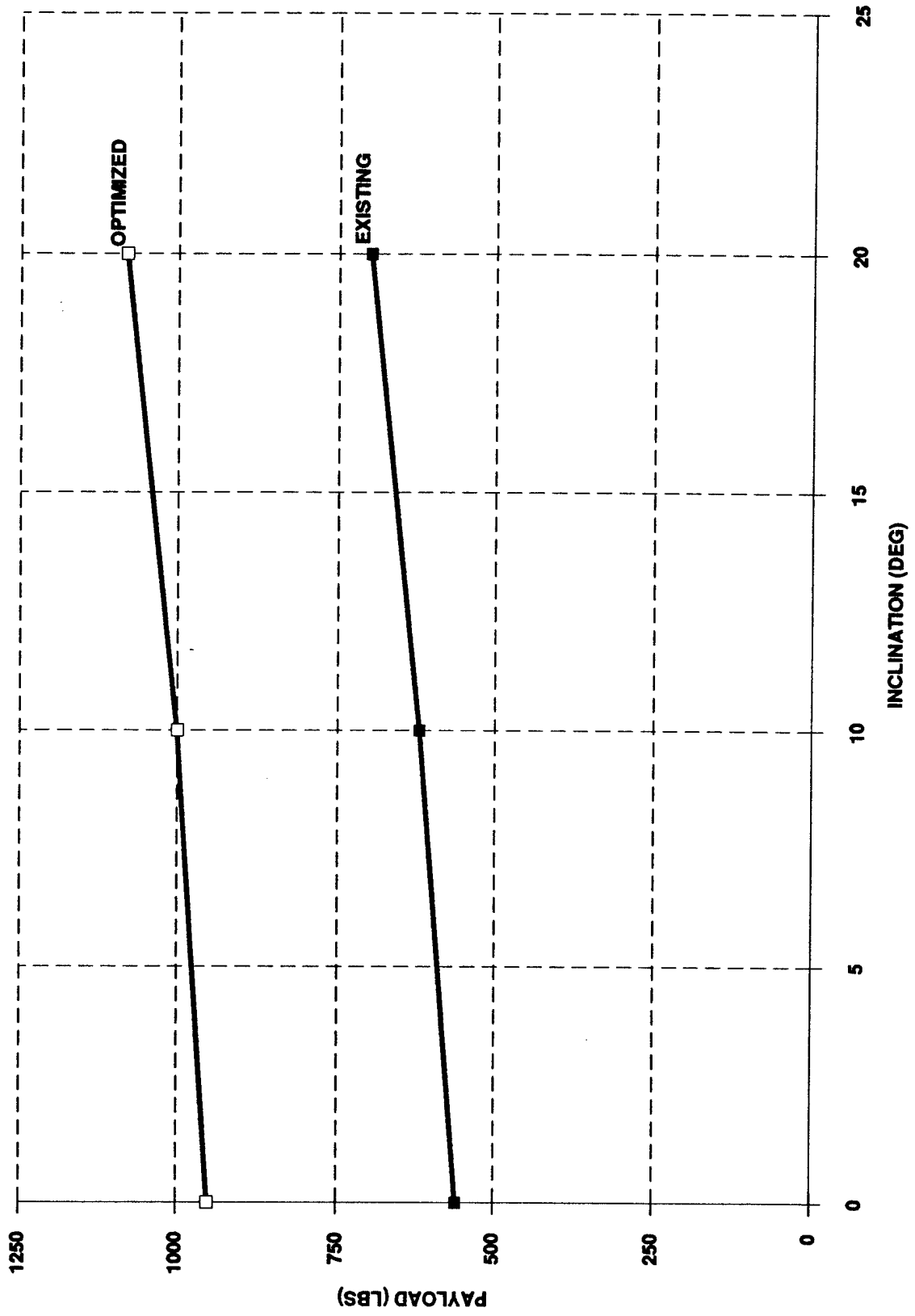
PEACEKEEPER ORBITAL PERFORMANCE
Low Altitude 50° And 28.5° Inclination



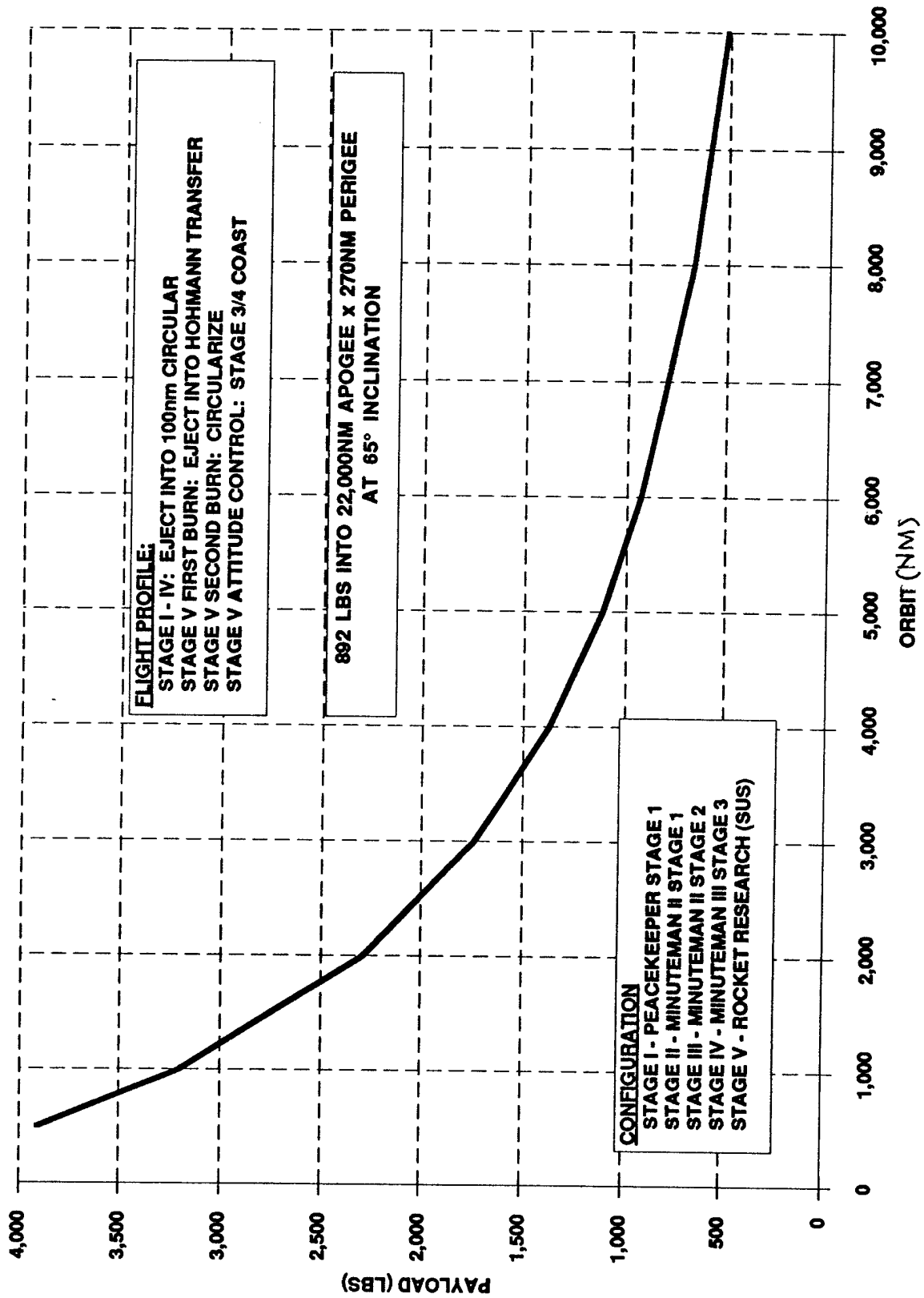
PEACEKEEPER ORBITAL PERFORMANCE
High Altitude 40° Inclination



PEACEKEEPER GEOSYNCHRONOUS ORBIT CAPABILITY
Circular Orbit at 19,369 NM



PEACEKEEPER / MM III ORBITAL PERFORMANCE



OTHER CONSIDERATIONS

MINUTEMAN II AGE AND RELIABILITY - NOT A PROBLEM

ON-GOING AGING SURVEILLANCE PROGRAM FOR MINUTEMAN I, II, AND III

INSPECT AND REFURBISH TO RSLP REQUIREMENTS

98% MISSION SUCCESS FOR MINUTEMAN I LAUNCHES

HIGH RELIABILITY FOR 30 YEAR OLD MINUTEMAN I STAGES

NO SIGNIFICANT DEGRADATION ON MINUTEMAN I STAGE I & II

SECURITY - IS A PROBLEM FOR NON-DOD USE

CLASSIFIED HARDWARE THROUGHOUT

COMMON WITH OPERATIONAL SYSTEMS

START TREATY - LAUNCH SITE CONSTRAINTS

ALLOWS USE FOR SPACE LAUNCH

NATIONAL POLICY FOR SPACE LAUNCH - BEING DEVELOPED

SUMMARY

MINUTEMAN & PEACEKEEPER ORBITAL CAPABLE

USING EXISTING STAGES

PERFORMANCE ENHANCED WITH UPGRADES

RSLP TO CONTINUE MINUTEMAN DOD SUBORBITAL R&D TEST VEHICLES

FOCUSES DOD RESOURCES ON R&D RATHER THAN ON TEST VEHICLE

ORBITAL/SUBORBITAL COMMONALITY

FACILITIES, RESOURCES AND HARDWARE

SIGNIFICANT SUNK DOD INVESTMENT IN THESE ASSETS